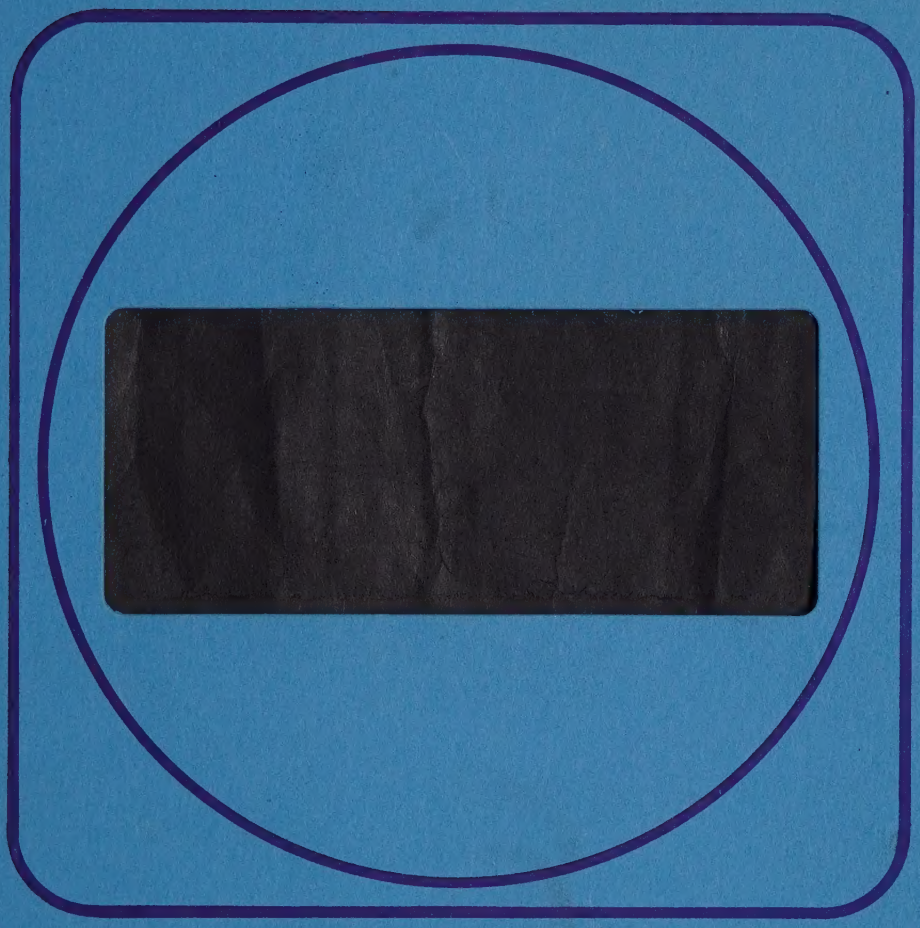

PROBESCOPE

211 ROBBINS LANE, SYOSSET, L.I., NEW YORK

INSTRUCTION MANUAL

SYNCHRONOUS SWEEP GENERATOR

MODEL VSG-500

PROBESCOPE CO., INC.

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SYNCHRONOUS SWEEP GENERATOR

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SYNCHRONOUS SWEEP GENERATOR

General Description

The synchronous sweep generator has been designed as an attachment for the spectrum analyzer. This attachment converts the analyzer into a sweep generator. The basic difference between the synchronous sweep generator and a standard sweep generator is that the synchronous sweep generator holds the signal under test in the very narrow notch of the analyzer crystal filter.

The sweep generator is constructed in a 3½" panel height to fit under the analyzer. When the analyzer is used alone, the sweep attachment should be turned off to prevent leakage into the analyzer I. F.

The sweep generator attachment is a self contained unit with its own power supply and can be purchased separately.

Theory of Operation

The swept oscillator is fed from the analyzer oscillator output jack into the oscillator input jack of the synchronous sweep generator. The swept oscillator frequency is mixed with the external crystal frequency to produce a sweep low frequency output that is fed back into the analyzer. Since the spectrum analyzer and the sweep generator output are both derived from the common analyzer swept oscillator, the output frequency of the sweeper will always be at the frequency being analyzed by the spectrum analyzer.

Since both the analyzer and sweeper are both controlled by the swept oscillator, the center frequency control and deviation control on the analyzer will operate both instruments.

The VS Model sweeper has a built in variable rate sawtooth generator built into the sweeper. In the fixed rate position, the analyzer sawtooth generator will control the trace on the CRT screen. In the variable rate position, the sawtooth generator in the sweeper attachment controls the trace.

When the output of the analyzer is fed directly into the analyzer, a continuous signal appears on the screen. The base line will rise to some value dependent on attenuator settings. When a filter or amplifier is placed between the sweeper output and the analyzer input, the amplitude vs. frequency characteristics of the system under test will appear on the cathode ray tube.

Operating Instructions

The sweep generator has its own power supply and the AC cord and the power switch must be turnod on. The BNC cable should then be attached from the oscillator output jack of the analyzer to the oscillator input jack of

the sweeper. When the sweeper is a VS model with a variable rate the octal plug cable should be attached between the analyzer and the sweeper. When the dummy plug is removed from the analyzer and the variable rate cable attached, there may be need to readjust the astigmatism control in the analyzer for the best focus of the display.

In order to check for proper operation of the equipment, the output of the sweeper should be connected into the input of the analyzer. The baseline on the cathode ray tube will rise. The deviation control should then be varied from maximum sweep width to minimum, if the baseline drops in amplitude when this control is reduced in sweep width. C15 trimmer capacitor located on the top right of the equipment should be adjusted for minimum amplitude variation.

The equipment is now ready for operation.

When the variable rate is built into the sweeper, the right and left edge controls on the front panel will control the trace on the cathode ray tube. If these controls are not set properly there will be no trace on the screen in the variable rate position. It may take a number of adjustments in order to adjust the trace properly.

The attenuator is a 1 DB to 64 DB binerary type. The attenuator is used to prevent overload and leakage around the equipment under test.

The output of the sweeper is 600 ohms. When the equipment under test has a 600 ohm input impedance, the 600 ohm load switch should be in the out position. For units under test with a higher input impedance the 600 ohm load should be in the in position.

Description of Equipment

The synchronous sweep generator consists of four basic parts. The power supply, crystal oscillator, oscillator input amplifiers and balanced modulator, and low frequency output amplifiers and filter.

The power supply is a series regulated type using a 6AS7, 6AU6, 5651, and 5U4.

The input 115 volts is stepped up to 700 volts by transformer T2. A center tap provides a dividing point so that 350 volts is applied to both plates of V8 (5U4). The two plates conduct alternately as each plate is made positive by the secondary of the transformer. Pulses of current flow from the filament line will show a one-directional flow.

The filter capacitors charge when the rectifier conducts and they discharge through the bleeder R58 and the load.

Tube V9 (6AS7) acts as a resistance in series with the load. If the input voltage drops, the voltage at the output of the filter drops.

Resistor R50 tube V10 (6AU6) and regulator VII (5651) are in series across the filter. VII regulator holds the cathode of V10 at a constant potential with respect to ground, setting of R56 determines the bias on V10. A fall in terminal voltage causes more negative bias on V10, less current through V10 and hence less current through R50. Less IR drop across R50 causes less negative bias on V9. V9 then acts as a lower value resistance and the terminal voltage increases.

R51 and R52 are small resistors to prevent oscillation. R53 and R54 are used to bleed voltage to the screen of V10. Capacitor C52 offers a low impedance path for high frequency surges.

The crystal oscillator is a pierce type with the tank circuit in series with the crystal. V15 acts as a series capacitor and is used to pull the frequency of the crystal to insure that the output signal will fall in the center of the crystal I.F. If the tank circuit is not tuned properly the tank will also tend to pull the crystal. In normal operation the tank is tuned for maximum output at pin 6 of V3 or V4. The oscillator balance control is used to balance the modulators. When the output is put on an oscilloscope the balance control is tuned for minimum RF output.

The oscillator input from the analyzer is fed to V1 (12AT7) amplifier, V1 is a conventional 2 stage triode amplifier. The amplified oscillator signal is then fed to the 6C4 which is a paraphase amplifier and feeds a 180° out of phase signal to the balanced modulator V3 and V4 (6BN6).

The balanced modulator is used to convert the input sweeping oscillator frequency into a sweep audio frequency output when mixed with the crystal oscillator.

Output Amplifier and Filter

The output of the balanced modulator is fed through the notch filter L1, C25, C17, L2, C26, and C16. This filter is tuned to reduce any RF signal in the output. The signal is then fed to the V5 (6AM6) amplifier and V7 (6C26) cathode follower. The output of the cathode follower is fed through the attenuator to the output terminals. S1 switch is used to connect R48 600 ohm loan across the output terminals.